Further Notes on Bopyrids from Kyûsyû and Ryûkyû

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In a former paper (Shiino, 1939b) I described some Bopyrids from Kyûsyû and Ryûkyû collected by Mr. Sadayosi Miyake of the Amakusa Marine Biological Station. The present description is a supplement to that paper, dealing with two more species, both new to science.

Genus *Eophrixus*

Caroli

Gen. *Phryxus* Rathke, subgen. *Eophrixus*. 1930, Caroli, E. Biol. Soc. Nat. Napoli, vol. 41, 1929, p. 262.

Gen. *Eophrixus*. 1931, Nierstrasz, H. F. and Brender à Brandis, G. A. Videns. Medd. Dansk Naturh. Foren, vol. 91, p. 201.

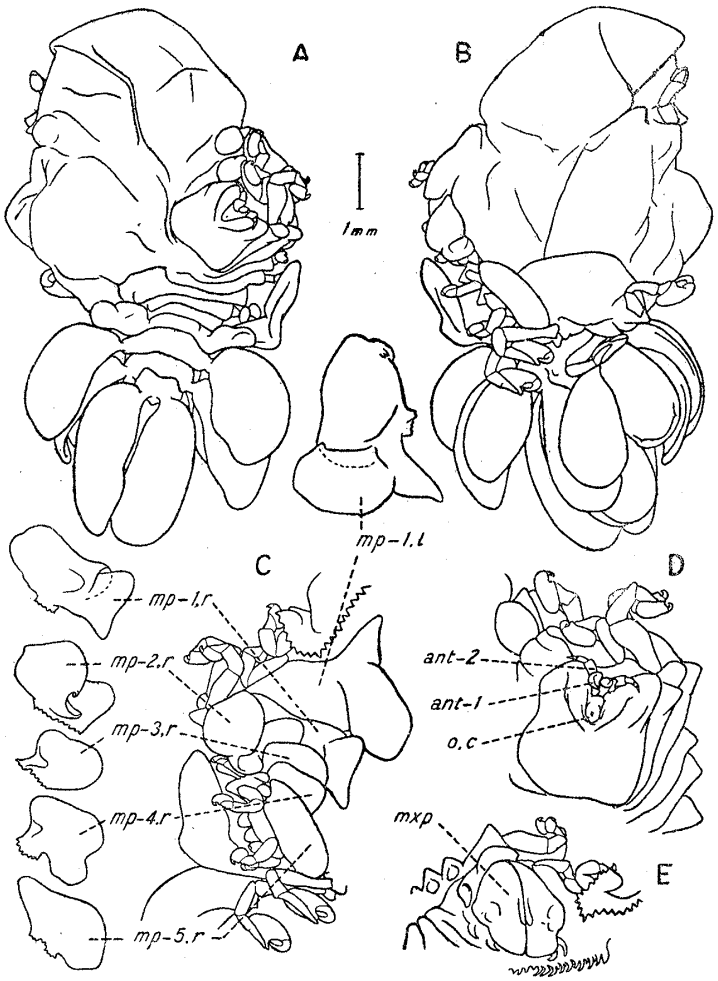

Fig. 1. *Eophrixus shojii* n. sp., female.

A, dorsal view; B, ventral view; C, ventral view of anterior part of thorax; left marsupial plates except the first are removed; D, cephalon, dorsal view; E, same, ventral view, with marsupial plates removed.

Abbreviations used in text-figures. *an-1*, antennule; *an-2*, antenna; *en*, endopodite; *ex*, exopodite; *lat*, lateral plate; *mp*, marsupial plate (e. g. *mp-1,l* first plate of left side; *mp-2, r* second plate of right side); *mx*, maxilla; *mxp* maxilliped; *o*, *c*, oral cone; *pl*, pleopod; *u*, uropod; *y*, secondary branch of exopodite.

Eophrixus shojii n. sp.

Female (Fig. 1, A & B): Deformed, strongly asymmetrical, with one side of thorax greatly swollen. Dorsal surface flat or slightly concave, ventral highly convex. No pigment, no eye. Length (excluding abdominal appendages) 7.2 mm, width 5.3 mm.

Cephalon (Fig. 1, A & D) deeply sunk in thorax; anterior margin bilobated, between which lobes cephalic appendanges are inserted. Antennule unsegmented, transformed into crispate lamella. Antenna of usual type, filiform and 3-jointed. Maxilliped narrow, without palp (Fig. 1, E). Posterior lamina bearing 2 lateral hooks on each side.

Thoracic segmentation distinct on smaller side, obsolete on enlarged side. Lateral parts of first 2 segments directed anteriorly and with rather distinct ovarian bosses and coxal plates. These bosses and plates are undifferentiated in other segments, where lateral plates are expanded on enlarged side, but narrow and truncate on the other. Seven pairs of peraeopoda present, of which first 2 pairs are situated close to lateral margins of cephalon. Other legs of smaller side crowded together on lateral margin of thorax. On enlarged side, 3rd leg situated in the middle of margin of marsupium, and at a considerable distance from both 2nd and 4th legs. Last 3 legs shifted to posterior side of thorax; they not only surpass other legs in size but also differ in constitution, being provided with larger propodites and longer and strongly curved dactylopodites. Marsupium vaulted. First pair of marsupial plates concealed beneath others, asymmetrical both in shape and in size as shown in Fig. 1, C. Second to 4th plates of enlarged side greatly expanded so as to form the main part of marsupium; 5th wanting. Corresponding plates of smaller side rudimentary, and largely covered by those of opposite side. Second plate divided into outer and inner lamellae, the one exposed, the other concealed. In 3rd and 4th plates external lamella reduced into dactyliform process. Fifth plate simple and completely exposed unlike foregoing ones.

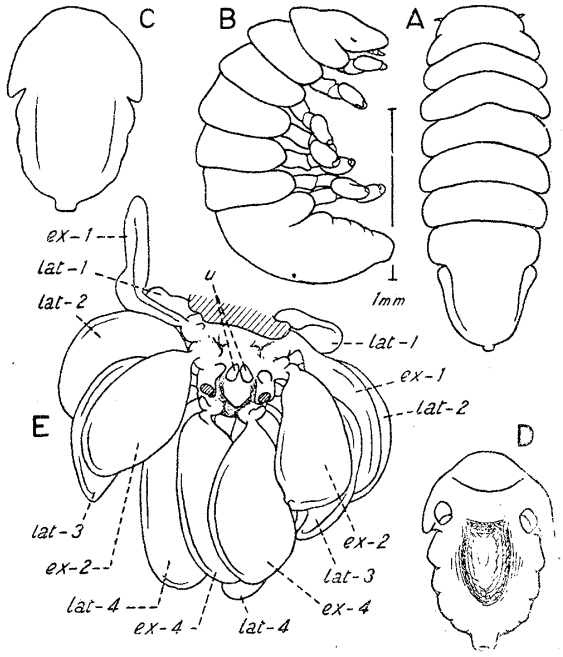

Fig. 2. *Eophrixus shojii* n. sp.
A-D, male. A, dorsal view; B, lateral view; C, abdomen with 7th thoracic segment, dorsal view; D, same, ventral view. E, female abdomen, ventral view; exopodites of 3rd pleopoda are removed in order to show rudimentary endopodites.

Abdomen composed of 5 segments, distinct only dorsally. Terminal segment (Fig. 2, E) very small, represented by a conical protuberance on ventral side of penultimate segment. Lateral plates of first 4 segments expanded in large oval foliaceous lobes freely projecting posteriorly; that of 1st segment much smaller and more irregular in shape (Fig. 1, A). Four pairs of pleopoda almost

uniramous; exopodites subequal to lateral plates both in size and in shape (Fig. 2, E, *ex*), while endopodites are reduced into small tubercles lying close to the bases of exopodites. Uropoda rudimentary, and represented by a pair of oval tubercles situated directly in front of terminal segment (Fig.2, E, *u*).

Male (Fig. 2, A & B): Short and stumpy, length 2.0 mm, width at 5th thoracic segment 0.5 mm. No pigment except that of eye.

Cephalon semicircular, fused with 1st thoracic segment; demarcation between the two indicated by marginal notches and by very shallow surface groove.

Thoracic segments subequal in width, and with rounded lateral margins. Last thoracic and all abdominal segments completely coalesced into a roughly oval piece (Fig. 2, C & D). Posterior limit of last thoracic segment indicated only by rather deep lateral incisions. Dorsal surface of abdomen arched, ventral surface excavated in the middle; lateral margin very slightly undulating indicative of original segmentation. Posterior end of abdomen provided with short, but rather thick anal tube. Pleopoda and uropoda absent.

Remarks: Caroli (1930) divided the genus *Phryxus* into 5 subgenera, *Eophrixus*, *Anisarthrus*, *Paraphrixus*, *Pliophrixus*, and *Phrixus* by the number and constitution of peraeopoda. All of these subgenera were later raised by Nierstasz and Brender à Brandis (1931) to the rank of genus. According to Caroli's definition, the present species belongs to *Eophrixus*, since all the peraeopoda are well developed. Thus far the genus is represented by three species all recorded by Caroli, viz. *lysmatae*, *laevimanus*, and *enchophilus*. Unfortunately, however, his descriptions of species, except the first named, do not extend beyond mentioning their respective hosts. Although the photographs of the hosts bearing the Bopyrids are inserted, these do not reveal anything of the specific characteristics of the parasites. Only *lysmatae* is given a short description on the structure of the peraeopods; also a sketch of the whole view of the female is appended. Judging from his Figs. 1 and 2 (Caroli, 1930, Tav. 9), it seems certain that the present species is distinguished from *lysmatae* by having much longer pleopoda and lateral plates.

Caroli does not say anything about the constitution of the pleopoda and uropoda. It is likely, however, that his species has also rudimentary endopodites, for some tubercle-like bodies are shown on the ventral side of the abdomen close to the bases of pleopoda (Tav. 9. Fig. 2).

No male has ever been recorded in the genus, so that the present descovery is the first.

Occurrence: Parasitic on the underside of the abdomen of *Alpheus japonicus* Ortmann collected in Tomioka Bay, Amakusa, by the late Mr. Kohachi Shoji, on September 23, 1930. Eight females each accompanied by a male are preserved in the Museum of the Zoological Institute of the Kyoto Imperial University.

Genus *Gigantione* Kossmann

1881, Kossmann, R. Z. wiss. Zool., vol. 35, p. 665

Gigantione ishigakiensis n. sp.

Female (Fig. 3, A): Asymmetrical; dorsal surface concave, ventral convex;

length 12.9 mm, width (excluding coxal plates) 13 mm. (Owing to bad preservation, both ends of body are strongly curved dorsally; the original length must have been somewhat larger.) No pigment.

Cephalon pentagonal, having trapezoid anterior and V-shaped posterior borders. Frontal lamina narrow in the middle, but produced laterally into a pair of large oval lobes. Antennule (Fig. 4, A) 3-jointed, with basal joint dilated and covering oral cone partly. Antenna long, 5-jointed, with basal joint also dilated. Maxilliped without palp.

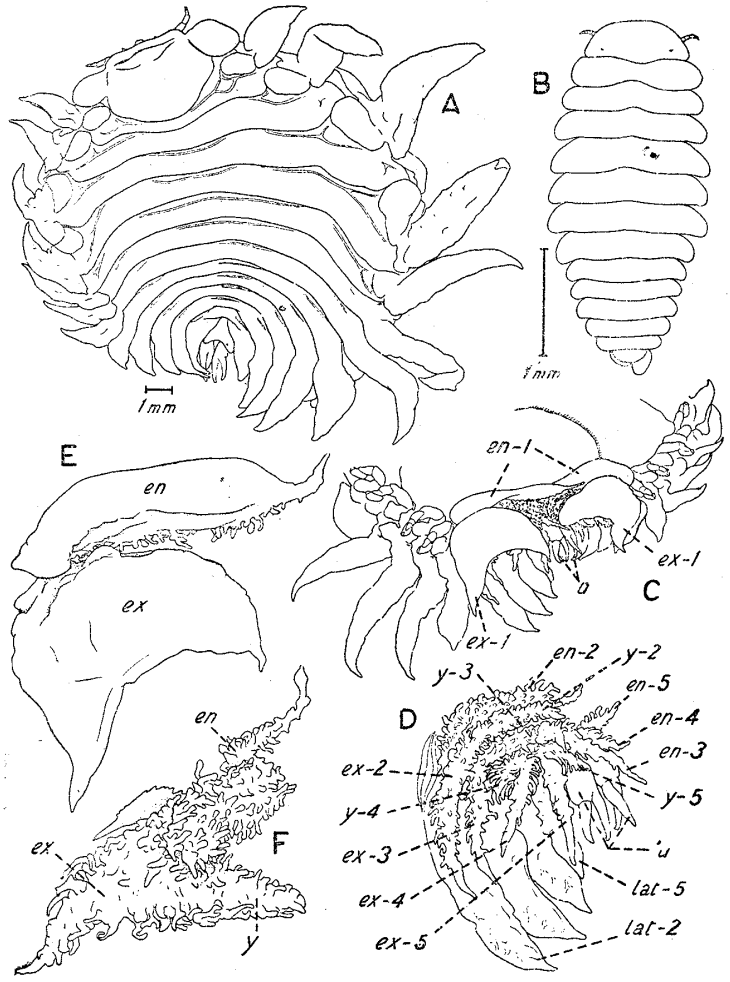

Fig. 3. *Gigantione ishigakiensis* n. sp.
A, female, dorsal view; B, male, dorsal view. C-E, female; C, posterior part of body, ventral view; D, 2nd to 4th pleopoda in situ, ventral view; E, first pleopod; F, second pleopod.

Thoracic segmentation distinct. Coxal plates freely projected laterally in all segments as elongate lobes tapering to tip. They are more developed on longer side than on shorter. Ovarian bosses present in first 4 segments on both sides as well as on longer side of 5th. Marsupium completely closed.

All abdominal segments distinct. Lateral plates of first 5 segments distinct, forming acuminate lobes like coxal plates of thoracal segments and directed posteriorly. Terminal segment triangular, without lateral plates, and much retreated from general outline of abdomen. First pair of pleopoda (Fig. 3, C & E) lamellar, much larger than other pairs and different in structure; exopodite roughly triangular covering greater part of other pleopoda, acuminated at both internal and external ends, and with quite smooth surface and margin; endopodite narrower covering posterior part of 5th oostegite, and with posterior margin fringed with digitiform processes. Remaining 4 pairs of pleopoda similar in constitution to one another (Fig. 3, D & F); appearing like triramous appendages, owing to secondary ramification of exopodites into inner (*y*) and outer lobes (*ex*); all rami thickly beset with digitiform tubercles both on

surface and on margin. Uropoda consist of more or less cylindrical protopodite and 2 rod-shaped branches; without tuberosity.

Male (Fig. 3, B): Short, 3.2 mm long, 1.5 mm wide at 6th thoracic segment. From this segment on body narrows slightly foreward and more strikingly backward. All body-segments disitnct. No pigment except small eyes.

Cephalon has widely rounded frontal margin. Antennule (Fig. 4, B) short, 3-jointed; antenna 6-jointed, filiform, extending beyond cephalic margin. Maxilla semicircular; maxilliped isosceles-triangular, terminating in a spine.

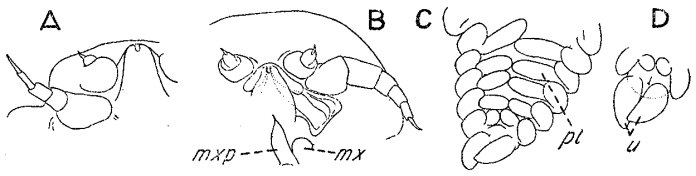

Fig. 4. *Gigantione ishigakiensis* n. sp.
A, right half of female cephalon, ventral view; B-C, male; B, left half of cephalon, ventral view; C, abdomen, ventral view; D, uropoda in situ, ventral view.

Thoracic segments with rounded lateral mragin, and no medio-ventral tubercles. Lateral parts of first 5 abdominal segments turned ventro-internally, and bear rod-shaped, medially directed uniramous pleopoda (Fig. 4, C). Last segment semicircular; uropoda unbranched, narrowly lamellar, extending backward beyond segment margin (Fig. 4, D).

Remarks: The present species is more clearly distinguished from *rathbunae* Stebbing and *bouvieri* Bonnier than the other two species of the genus thus far recorded, by the state of coxal plates and by that of the digitation of pleopoda. It differs from *moebii* Kossmann in its shorter abdomen as well as in that the antennular bases do not cover the oral cone completely, and from *giardi* Nobili in the absence of the pleural plate in the last abdominal segment.

Occurrence: A female bearing a male was found in the branchial cavity of *Carpilius convexus* (Forskål) caught on a coral reef at Shika, Ishigakishima, by Mr. S. Miyake, on July 8, 1933. They are preserved in the Museum of the Zoological Institute of the Kyoto Imperial University.

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